



US009188345B1

(12) **United States Patent**
Lu

(10) **Patent No.:** **US 9,188,345 B1**
(45) **Date of Patent:** **Nov. 17, 2015**

(54) **ELECTRIC FIREPLACE HAVING
MULTI-FUNCTION FLAME**

(56) **References Cited**

U.S. PATENT DOCUMENTS

(71) Applicant: **Dong Guan Song Wei Electric
Technology Co., Ltd.**, Dongguan (CN)

5,266,817	A *	11/1993	Lin	257/89
2008/0105884	A1 *	5/2008	Wu et al.	257/88
2012/0155075	A1 *	6/2012	Asofsky et al.	362/231
2013/0077287	A1 *	3/2013	Lu	362/92
2014/0004423	A1 *	1/2014	Endo et al.	429/223
2014/0185281	A1 *	7/2014	Lee et al.	362/231

(72) Inventor: **Weilin Lu**, Dongguan (CN)

(73) Assignee: **Dong Guan Song Wei Electric
Technology Co., Ltd.**, Dongguan,
Guangdong (CN)

FOREIGN PATENT DOCUMENTS

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 0 days.

CN	201050823	Y *	4/2008
CN	201819303	U *	5/2011
CN	202521701	U *	11/2012

* cited by examiner

Primary Examiner — Casandra Davis

(21) Appl. No.: **14/656,698**

(74) *Attorney, Agent, or Firm* — Leong C. Lei

(22) Filed: **Mar. 12, 2015**

(57) **ABSTRACT**

(30) **Foreign Application Priority Data**

May 20, 2014 (CN) 2014 1 0211805

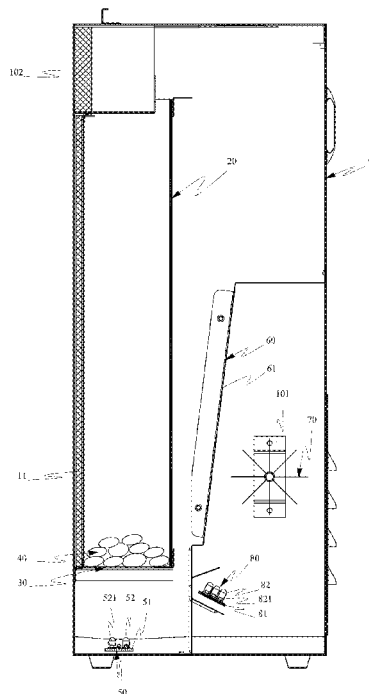
An electric fireplace having multi-function flame includes a housing, a projection screen, a plastic screen, plastic crystals, a first illuminating device, a flame image plate, a reflection assembly, and a second illuminating device. The first illuminating device can shoot a single color or two colors or a combination of more than two colors of light. The second illuminating device includes a plurality of second lights disposed on a second circuit board. Each of the second lights includes at least two different chips. The second illuminating device can shoot a single color or two colors or a combination of more than two colors of light. The present invention can generate single or multi-color flame to achieve a multi-function purpose. The change effect of the movement and color of the flame can be more perfect and realistic and appreciation.

(51) **Int. Cl.**
F24B 1/18 (2006.01)
F24C 7/00 (2006.01)

(52) **U.S. Cl.**
CPC **F24C 7/004** (2013.01)

(58) **Field of Classification Search**
CPC F24C 7/004; F21S 10/04; G09F 19/12;
A63J 5/023; F21W 2131/406
See application file for complete search history.

9 Claims, 3 Drawing Sheets



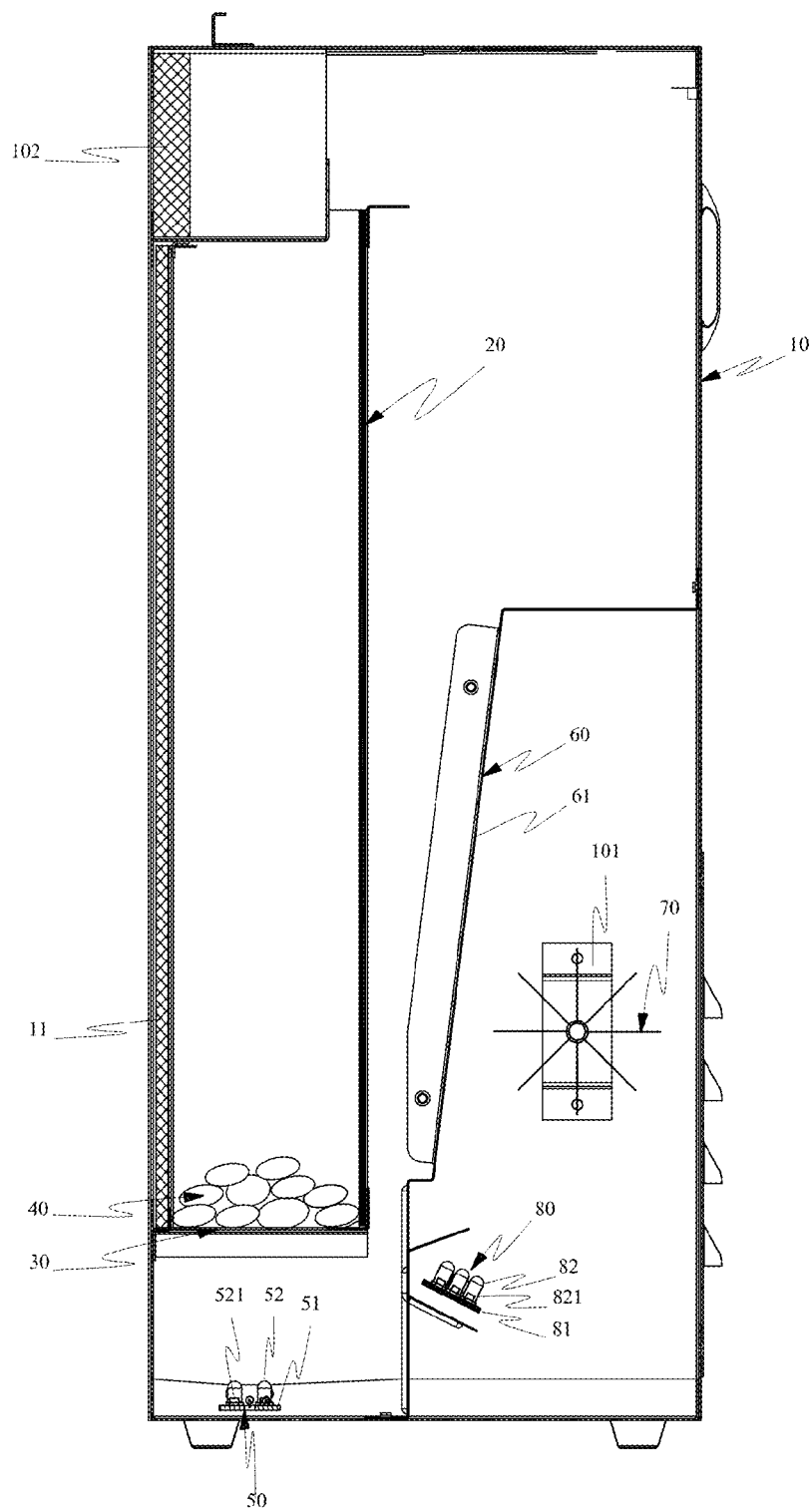


FIG. 1

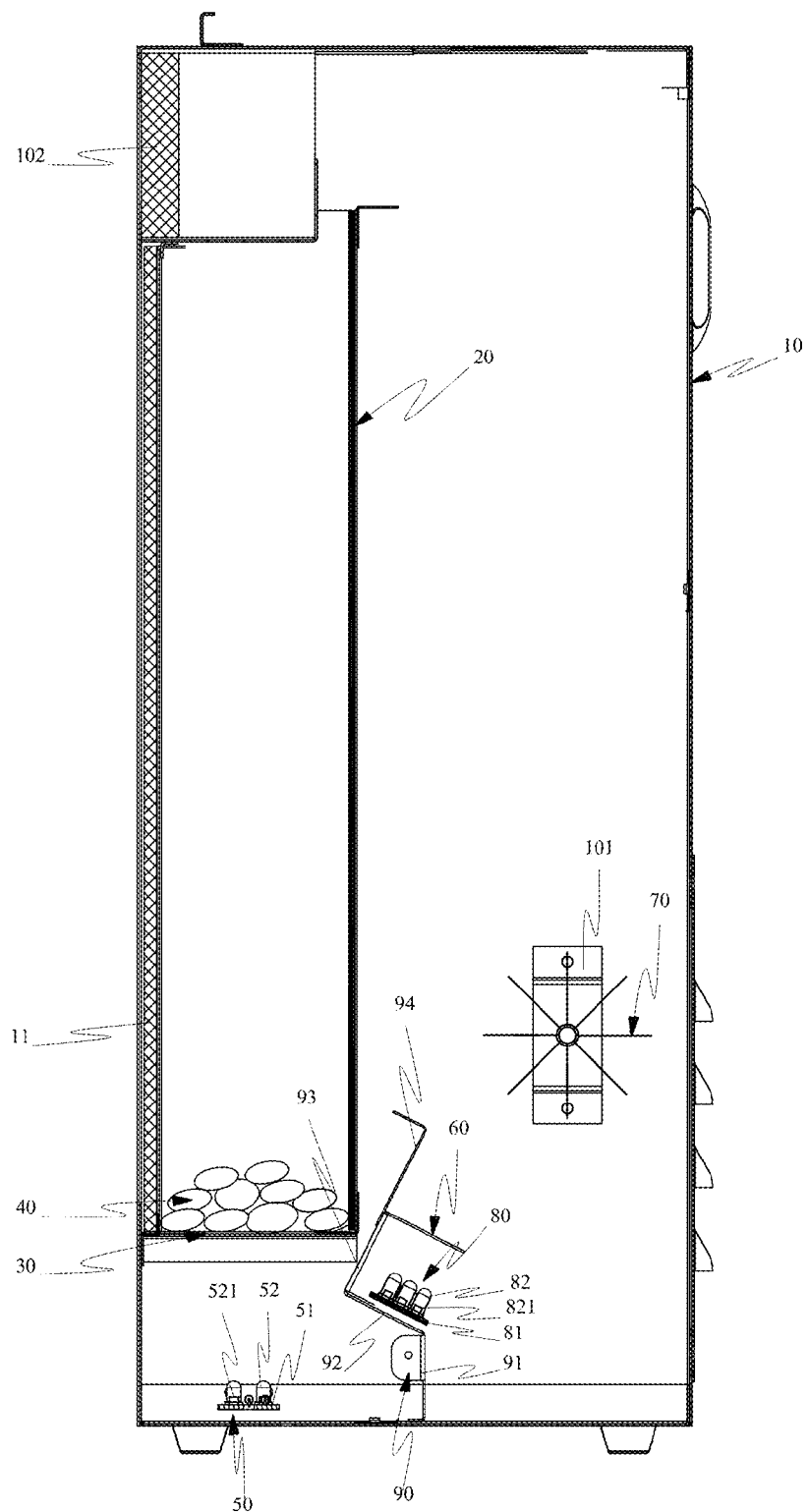


FIG. 2

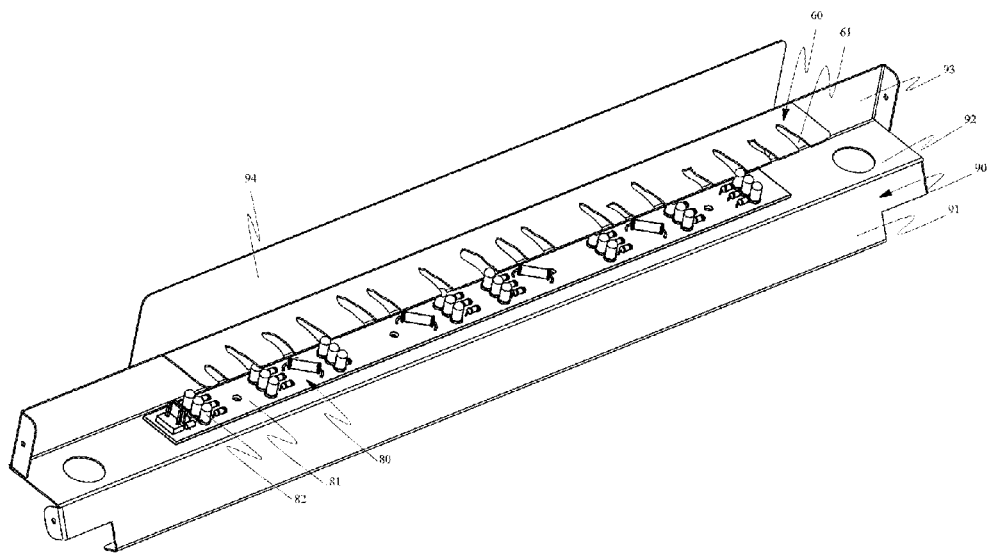


FIG. 3

1

ELECTRIC FIREPLACE HAVING MULTI-FUNCTION FLAME

(a) TECHNICAL FIELD OF THE INVENTION

The present invention relates to an electric fireplace, and more particularly to an electric fireplace having multi-function flame.

(b) DESCRIPTION OF THE PRIOR ART

In the early days, a fireplace can be used for lighting, warming, baking. With the development of economy and technology, the three functions of lighting, warming, baking are gradually improved and separated. These days, a fireplace becomes special warming equipment.

With the development of times, fireplaces are improved from the traditional fireplaces, such as wood burning fireplaces, fuel gas fireplaces or charcoal fireplaces, to electric fireplaces. The electric fireplaces come from the European classical fireplaces to cooperate with acoustics and optics technique to make a great change for the traditional fireplaces. The electric fireplaces are green and friendly-environmental and provide a realistic burning effect.

In these days, electric fireplaces are rapidly developed to substitute the traditional fireplaces. However, the existing electric fireplaces only provide a single color flame and a single function, without aesthetic feeling. Accordingly, the inventor of the present invention has devoted himself based on his many years of practical experiences to solve this problem.

SUMMARY OF THE INVENTION

The primary object of the present invention is to provide an electric fireplace having multi-function flame to overcome the shortcomings of the existing electric fireplaces.

In order to achieve the aforesaid object, the electric fireplace having multi-function flame of the present invention comprises a housing, a projection screen, a plastic screen, plastic crystals, a first illuminating device, a flame image plate, a reflection assembly, and a second illuminating device disposed in the housing. The housing has a window. The projection screen and the plastic screen are located at an inner side of the window. The projection screen is disposed vertically. The plastic screen is levelly disposed at a lower end of a front side of the projection screen. The plastic crystals are disposed on an upper surface of the plastic screen. The first illuminating device comprises a first circuit board and a plurality of first lights disposed on the first circuit board. Each of the first lights comprises at least two different chips. The first illuminating device projects at least one colored light on the plastic screen, and then the light is reflected to the plastic crystals. The flame image plate, the reflection assembly, and the second illuminating device are disposed in back of the projection screen. The flame image plate has a plurality of flame holes thereon. The reflection assembly is rotatable. The second illuminating device comprises a second circuit board and a plurality of second lights disposed on the second circuit board. Each of the second lights comprises at least two different chips. The second illuminating device projects at least one colored light on the reflection assembly, and then the light is reflected to the projection screen.

Compared to the prior art, the present invention has obvious advantages and beneficial effects described as below. Through the plurality of first lights disposed on the first circuit board of the first illuminating device and the at least two

2

different chips of each first light, the first illuminating device can shoot a single color or two colors or a combination of more than two colors of light. The colored light is projected on the plastic screen and then diverted to the plastic crystals.

The user can see the plastic crystals illuminating and shining through the window. Through the plurality of second lights disposed on the second circuit board of the second illuminating device and the at least two different chips of each second light, the second illuminating device can shoot a single color or two colors or a combination of more than two colors of light. The colored light is reflected by the reflection assembly to project on the projection screen. The user can see imitation flame dancing behind the projection screen through the window. The present invention can generate single or multi-colored flame to achieve multiple functions. The change effect of the movement and color of the flame can be more perfect and realistic and appreciation. For aesthetic requirements, especially applicable for electric fireplace cabinets and home decoration use, the present invention improves the quality of life and market prospects and has significant economic benefits.

The flame image plate is disposed between the reflection assembly and the second illuminating device and extends outward from the support. The flame image plate is located above the second illuminating device to cover the second illuminating device, so that the light from the second illuminating device is first formed through the flame image plate and then reflected by the reflection assembly to project on the projection screen so as to enhance the flame imitation effect greatly and to reduce the material of the flame image plate and the occupying space effectively. The flame image plate can be installed conveniently.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a sectional view according to a first embodiment of the present invention;

FIG. 2 is a sectional view according to a second embodiment of the present invention; and

FIG. 3 is a perspective view showing the second illuminating device according to the second embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Embodiments of the present invention will now be described, by way of example only, with reference to the accompanying drawings.

As shown in FIG. 1, the electric fireplace according to a first embodiment of the present invention comprises a housing 10, a projection screen 20, a plastic screen 30, plastic crystals 40, a first illuminating device 50, a flame image plate 60, a reflection assembly 70, and a second illuminating device 80 disposed in the housing 10.

The housing 10 has a rectangular shape. The housing 10 has a window 11 located at a front side thereof. The window 11 is a tempered glass or a meshed door. The imitation flame projected from the inside of the housing 10 can be seen through the window 11.

Both the projection screen 20 and the plastic screen 30 are located at an inner side of the window 11. The projection screen 20 is disposed vertically. Two surfaces of the projection screen 20 faces forward and rearward, respectively. The plastic screen 30 is levelly disposed at a lower end of a front side of the projection screen 20. Two surfaces of the plastic screen 30 faces forward and rearward, respectively. The plas-

3

tic crystals **40** are disposed on an upper surface of the plastic screen **30**. The plastic crystals **40** are in a circle, an oval, a rhombus, a polygon, or a square shape. The color of the plastic crystals **40** is transparent, red, yellow, green, blue, or cyan.

The first illuminating device **50** comprises a first circuit board **51** and a plurality of first lights **52** disposed on the first circuit board **51**. Each first light **52** comprises at least two different chips **521**. In this embodiment, each first light **52** comprises four chips **521** which are red, yellow, blue, and green. The chips **521** are encapsulated separately or integrally on the first circuit board **51**. In this embodiment, the chips **521** are encapsulated separately for convenient maintenance and replacement. The first illuminating device **50** projects at least one colored light on the plastic screen **30**, and then the light is reflected to the plastic crystals **40**.

The flame image plate **60**, the reflection assembly **70**, and the second illuminating device **80** are disposed in back of the projection screen **20**. The flame image plate **60** has a plurality of flame holes **61** thereon. The reflection assembly **70** is rotatable. In this embodiment, the flame image plate **60** is disposed between the projection screen **20** and the reflection assembly **70**. The reflection assembly **70** is driven by a synchronous motor **101** to turn at a predetermined speed.

The second illuminating device **80** is located under the reflection assembly **70**. The second illuminating device **80** comprises a second circuit board **81** and a plurality of second lights **82** disposed on the second circuit board **81**. Each second light **82** comprises at least two different chips **821**. In this embodiment, each second light **82** comprises four chips **821** which are red, yellow, blue, and green. The chips **821** are encapsulated separately or integrally on the second circuit board **81**. In this embodiment, the chips **821** are encapsulated separately for convenient maintenance and replacement.

The second illuminating device **80** projects at least one colored light on the reflection assembly **70**, and then the light is reflected to the projection screen **20**.

The present invention further comprises a controller **102**. The controller **102** is adapted to control the first illuminating device **50** and the second illuminating device **80** to illuminate, such that the present invention can form one or more colors of imitation flame during work.

When in use, the controller **102** is used to control the first illuminating device **50** and the second illuminating device **80**. The first illuminating device **50** shoots a single color or two colors or a combination of more than two colors of light within a certain time interval in turn automatically. The colored light is projected on the plastic screen **30** and then diverted to the plastic crystals **40**. The user can see the plastic crystals **40** illuminating and shining through the window **11**. The second illuminating device **80** shoots a single color or two colors or a combination of more than two colors of light within a certain time interval in turn automatically. The colored light is reflected by the reflection assembly **70** to project on the projection screen **20** through the flame holes **61**. The user can see imitation flame dancing behind the projection screen **20** through the window **11**. Besides, the first illuminating device **50** and the second illuminating device **80** are controlled by the controller **102** to shoot a single color or two colors or a combination of more than two colors of light within a certain time interval in turn automatically. The illumination of the first illuminating device **50** and the second illuminating device **80** can be adjusted through the controller **102**.

4

FIG. **2** and FIG. **3** show a second embodiment of the present invention. The second embodiment is substantially similar to the first embodiment with the exceptions described hereinafter.

In the second embodiment, the flame image plate **60** is located between the reflection assembly **70** and the second illuminating device **80**. The second illuminating device **80** is located under the reflection assembly **70**. The second illuminating device **80** is installed on a support **90**. The flame image plate **60** is disposed on the support **90** and bent to extend outward. Specifically, the support **90** comprises an installation portion **91**, a bearing portion **92**, and a connection portion **93** which are integrally formed. The installation portion **91** is vertically disposed. The installation portion **91** is fixed to the inner bottom of the housing **10**. The bearing portion **92** extends obliquely, forward and upward. The connection portion **93** extends obliquely, rearward and upward. The second illuminating device **80** is fixed on the surface of the bearing portion **92**. The flame image plate **60** is bent at the distal end of the connection portion **93** to extend obliquely, rearward and downward. In this embodiment, the connection portion **93** is perpendicular to the bearing portion **92**. The flame image plate **60** is parallel to the bearing portion **92**. The flame image plate **60** is disposed above the second illuminating device **80** to cover the second illuminating device **80**. The top end of the connection portion **93** is provided with a stop plate **94**. The stop plate **94** is in a reverse L shape. The stop plate **94** extends obliquely and upward. The stop plate **94** is adapted to block the light, so that most of the light is projected on the reflection assembly **70**.

The work procedure of the second embodiment is similar to that of the first embodiment with the exceptions described hereinafter. The colored light from the second illuminating device **80** shoots the reflection assembly **70** through the flame holes **61** of the flame image plate **60**, and then is reflected by the reflection assembly **70** to project on the projection screen **20**. This way also achieves the projection of colored light and generates imitation dancing flame behind the projection screen **20**.

Although particular embodiments of the present invention have been described in detail for purposes of illustration, various modifications and enhancements may be made without departing from the spirit and scope of the present invention. Accordingly, the present invention is not to be limited except as by the appended claims.

I claim:

1. An electric fireplace having multi-function flame, comprising a housing, a projection screen, a plastic screen, plastic crystals, a first illuminating device, a flame image plate, a reflection assembly, and a second illuminating device disposed in the housing; the housing having a window, the projection screen and the plastic screen being located at an inner side of the window, the projection screen being disposed vertically, the plastic screen being levelly disposed at a lower end of a front side of the projection screen, the plastic crystals being disposed on an upper surface of the plastic screen; the first illuminating device comprising a first circuit board and a plurality of first lights disposed on the first circuit board, the first lights each comprising at least two different chips; the first illuminating device projecting at least one colored light on the plastic screen and then the light being reflected to the plastic crystals; the flame image plate, the reflection assembly, and the second illuminating device being disposed in back of the projection screen, the flame image plate having a plurality of flame holes thereon, the reflection assembly being rotatable; the second illuminating device comprising a second circuit board and a plurality of second lights disposed on

5

the second circuit board, the second lights each comprising at least two different chips; the second illuminating device projecting at least one colored light on the reflection assembly and then the light being reflected to the projection screen, wherein the flame image plate is located between the reflection assembly and the second illuminating device, the second illuminating device being located under the reflection assembly, the second illuminating device being installed on a support, the flame image plate being disposed on the support and bent to extend outward.

2. The electric fireplace having multi-function flame as claimed in claim 1, wherein the flame image plate is disposed between the projection screen and the reflection assembly, the second illuminating device being located under the reflection assembly.

3. The electric fireplace having multi-function flame as claimed in claim 1, wherein the support comprises an installation portion, a bearing portion, and a connection portion which are integrally formed, the installation portion being vertically disposed, the bearing portion extending obliquely, forward and upward, the connection portion extending obliquely, rearward and upward, the second illuminating device being fixed on a surface of the bearing portion, the flame image plate being bent at a distal end of the connection portion to extend obliquely, rearward and downward.

4. The electric fireplace having multi-function flame as claimed in claim 3, wherein the connection portion is perpen-

6

dicular to the bearing portion, the flame image plate being perpendicular to the connection portion, a top end of the connection portion being provided with a stop plate, the stop plate having a reverse L shape, the stop plate extending obliquely and upward.

5. The electric fireplace having multi-function flame as claimed in claim 1, wherein the first lights each comprises four chips which are red, yellow, blue, and green and encapsulated separately or integrally on the first circuit board, the second lights each comprising four chips which are red, yellow, blue, and green and encapsulated separately or integrally on the second circuit board.

6. The electric fireplace having multi-function flame as claimed in claim 1, further comprising a controller for controlling the first illuminating device and the second illuminating device.

7. The electric fireplace having multi-function flame as claimed in claim 1, wherein the reflection assembly is driven by a synchronous motor.

8. The electric fireplace having multi-function flame as claimed in claim 1, wherein the plastic crystals are in a circle, an oval, a rhombus, a polygon, or a square shape.

9. The electric fireplace having multi-function flame as claimed in claim 1, wherein the color of the plastic crystals is transparent, red, yellow, green, blue, or cyan.

* * * * *